Workcell Automation of Piece Part Production

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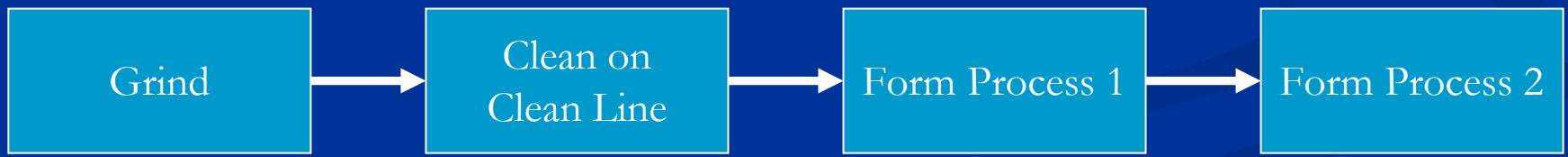
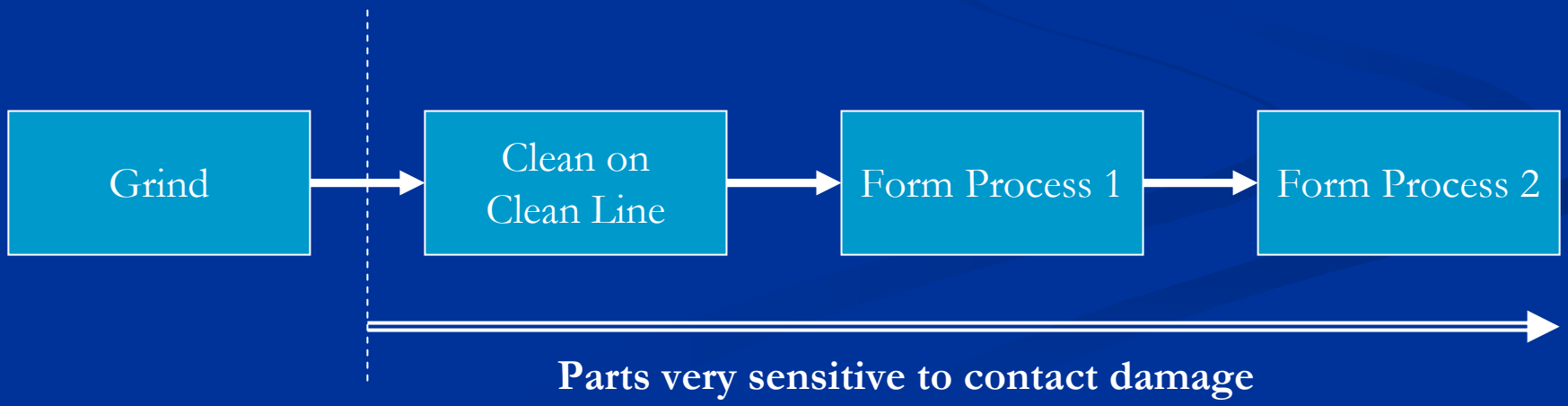
Current Production Process

- Alcoa
- Close tolerance parts subject to handling damage
- Process involves many forming, machining and cleaning operations
- Each operation is presently performed without much consideration to the process as a whole
- Parts are stored stacked in bins between operations, carried from workstation to workstation and to the clean line manually



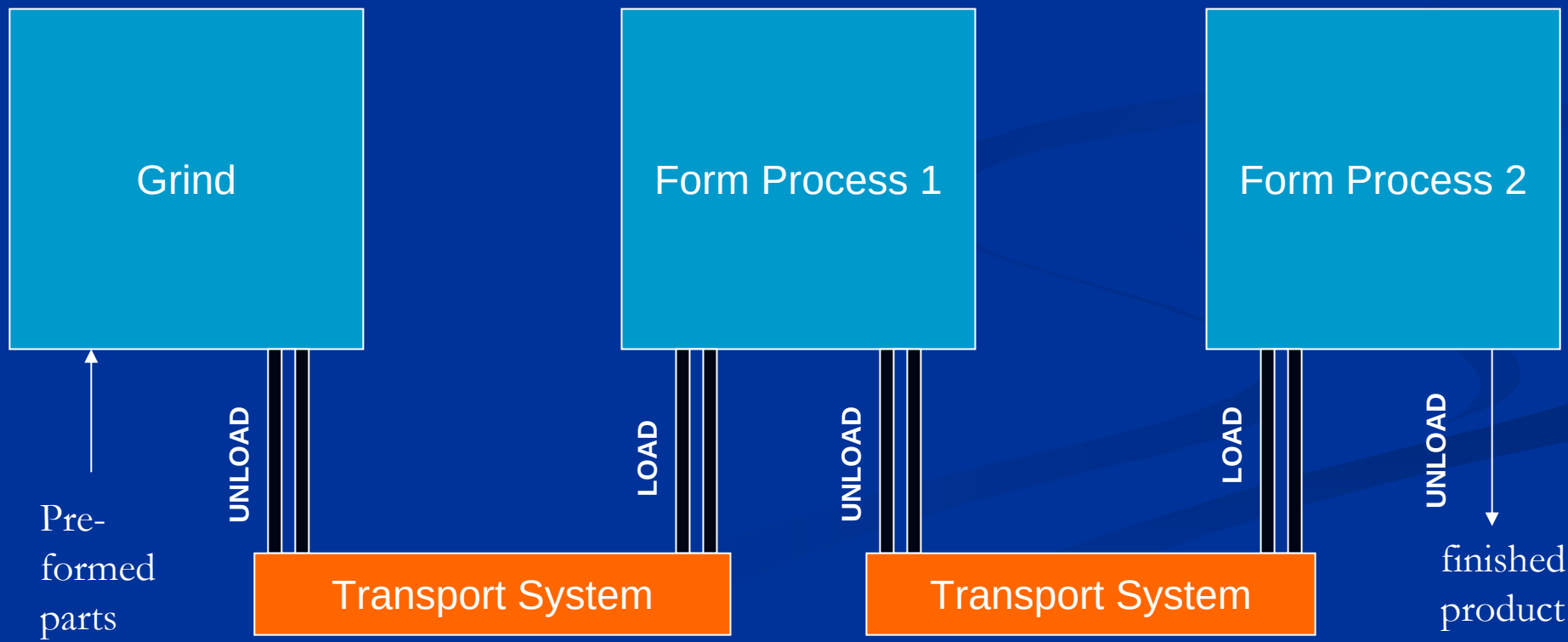
Weaknesses of Current Production Method

- Parts very sensitive to contact damage after finish sizing at grind thread
- Process involves large amount of worker interaction and part handling (detrimental to damage and cost)
- Parts are oriented by the operator to load each machine, then placed in an uncontrolled queue until next operation
- Cleaning operation requires transport to and from cleaning area
- Workcell automation would greatly increase productivity and part quality, this is our goal



Design Considerations

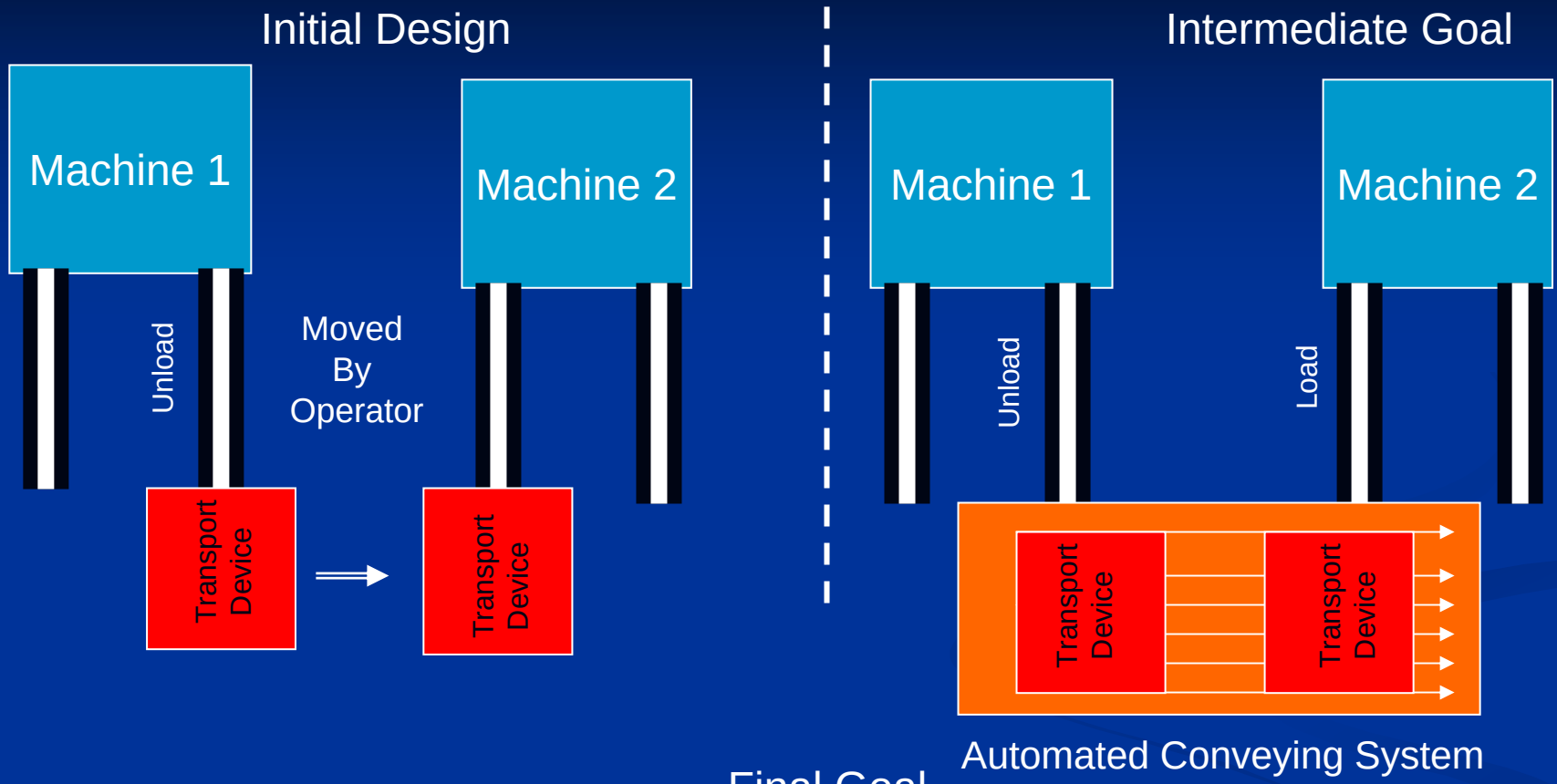
- Design must be well thought out in both a technical and logistical sense
- Downtime during implementation must be kept to an absolute minimum
- The details of each machine are not precisely known, so design must be easily adaptable
- The transport system must require minimal adjustment for changes in bolt diameter and length
- Design should be modular to allow testing of each component prior to implementation



Project Goals

- Design and implement workcell automation scheme
- Specify inline cleaning solution to work within cell
- Design and prototype transport device for moving fasteners between machines
- Interface transport device to automation already present on machines
- Supplement automation present on machines if necessary
- Predict and measure productivity increase and cost benefits
- Future tasks will also include grinding process optimization

Batch Conveying System

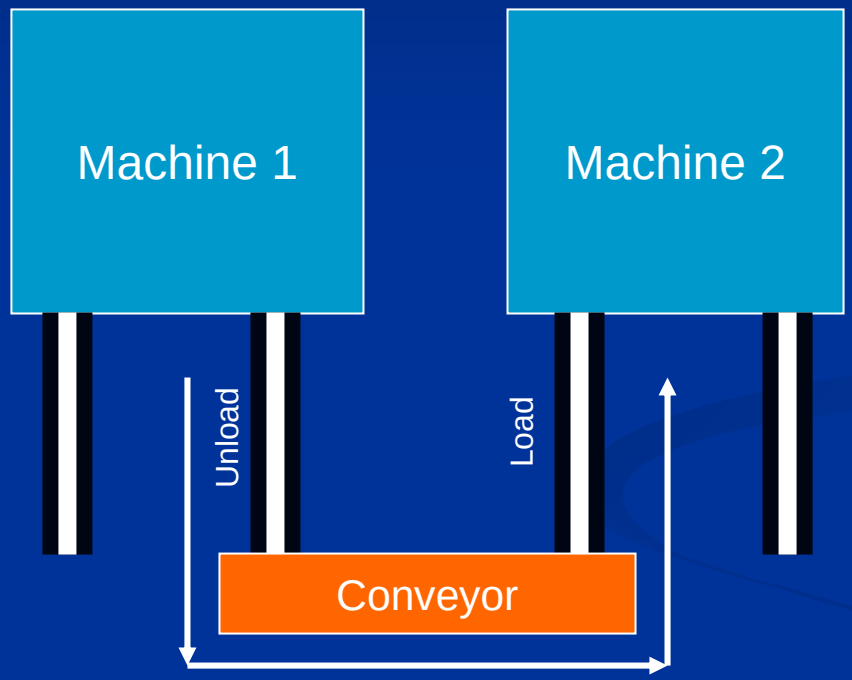


Final Goal

Pre-Formed Parts → Automated Grind, Clean, Form Process 1, Form Process 2 & Inspection → Complete, Inspected Parts

Completely Automated Cell

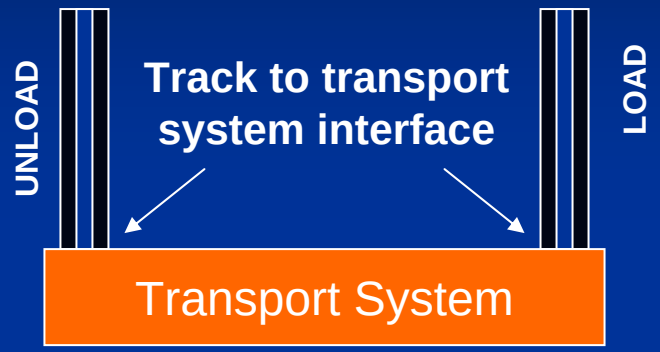
Continuous Conveying System



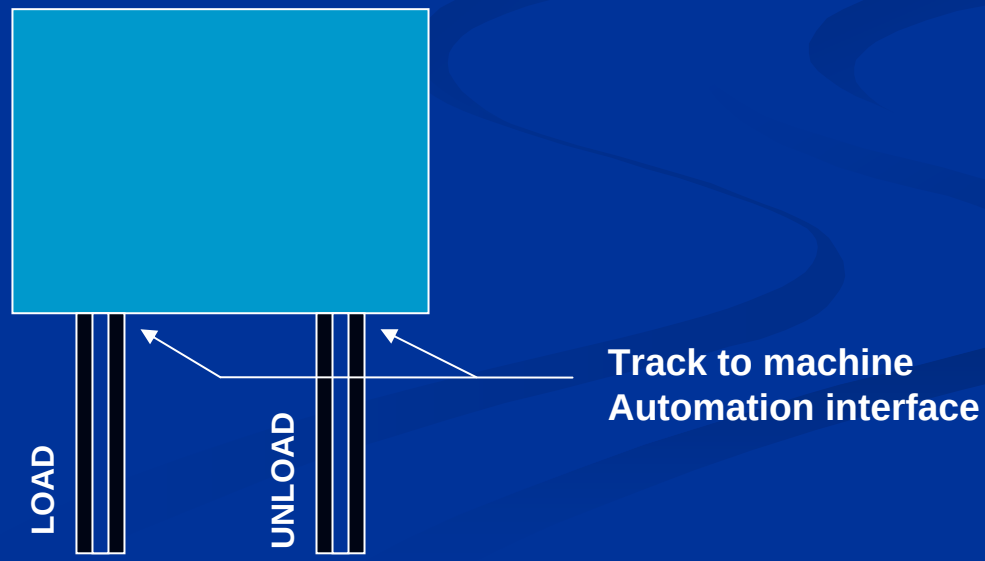
Parts are moved continuously from machine to machine

Development Strategy

Phase 1 – To be Completed at Georgia Tech



Phase 2 – To be Completed during internship



Questions?